

## CLAIMS

Having thus described my invention, what I claim as new and desire to secure by Letters Patent is as follows:

- 1        1. A method of measuring overlay alignment of sequential lithographic exposures, said method including steps of
  - 4              forming first separated features on a surface,
  - 6              forming second separated features on said surface interleaved between said first separated features, and
  - 9              illuminating said first and second separated features and detecting an interference pattern.
- 1        2. A method as recited in claim 1, including the further step of calculating a spectrographic response corresponding to said interference pattern.
- 1        3. A method as recited in claim 1, wherein said illuminating and detecting step is performed with a specular spectroscopic scatterometer.
- 1        4. A method as recited in claim 3 wherein said scatterometer is of the reflectometer type.
- 1        5. A method as recited in claim 3 wherein said scatterometer is of the ellipsometer type.
- 1        6. A method as recited in claim 5, wherein said ellipsometer measures complex reflectivity spectral ratio for two orthogonal polarizations with broadband illumination.

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1       7. A method as recited in claim 1 wherein said  
2       illumination is broadband light.

1       8. A method as recited in claim 1 wherein said  
2       detection measures amplitude and phase.

1       9. A method as recited in claim 1, wherein said  
2       illumination and detection step results in  
3       measured spectral curves and including the further  
4       steps of

5               modelling said first and second features by  
6               simulation to obtain simulated spectral curves,  
7               and

8               comparing said measured spectral curves with  
9               said simulated spectral curves.

1       10. A method as recited in claim 9, wherein said  
2       comparing step includes use of an optimization  
3       technique to determine best fit and to quantify a  
4       misalignment value.

1       11. A test mark including  
2               a plurality of marks formed by a lithographic  
3               exposure,  
4               a mark formed between said plurality of marks  
5               by another lithographic exposure,  
6               said mark and said plurality of marks forming  
7               a periodic structure.

1       12. A non-imaging metrology apparatus comprising  
2           means for storing spectral curves,  
3           a specular spectroscopic scatterometer for  
4       measuring reflection from a plurality of marks  
5       formed by two lithographic exposures and forming a  
6       periodic structure, and  
7           means for comparing processed signals output  
8       from said specular spectroscopic scatterometer  
9       with said spectral curves to evaluate misalignment  
10      of said two lithographic exposures.

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